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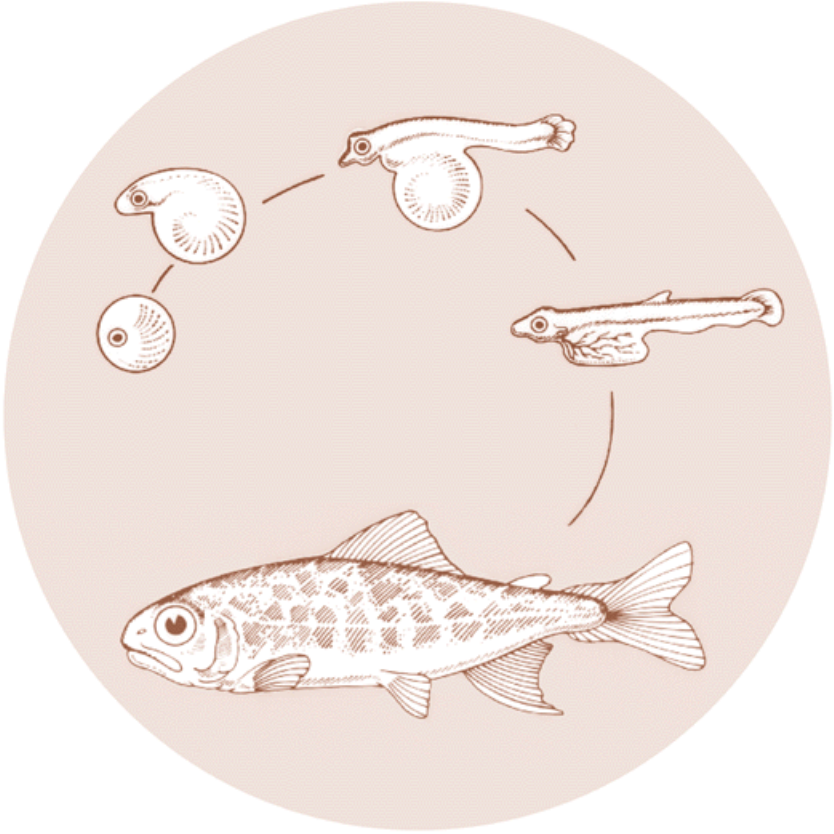
INTEGRATED HATCHERY OPERATIONS TEAM OPERATION PLANS FOR ANADROMOUS FISH PRODUCTION FACILITIES IN THE COLUMBIA RIVER BASIN

Volume II

Annual Report 1992



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Bonneville Power Administration
Environment, Fish and Wildlife Division
P.O. Box 3621
905 N.E. 11th Avenue
Portland, OR 97208-3621

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OPERATION PLANS FOR ANADROMOUS FISH PRODUCTION FACILITIES IN THE COLUMBIA RIVER BASIN VOLUME II

ANNUAL REPORT 1992

Prepared by:

Bill Hutchison

Idaho Department of Fish and Game

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
P.O. Box 3621
Portland, OR 97283-362

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Acronyms or Abbreviations Used in this Report

BPA: Bonneville Power Administration
cfs: Cubic feet per second.
CHF: Fall Chinook
CHS: Spring Chinook
CHR: Summer Chinook
CIS: Coordinated Information System
COH: Coho
CRITFC: Columbia River Inter-Tribal Fish Commission
ESA: Endangered Species Act
FERC: Federal Energy Regulatory Commission
IDFG: Idaho Department of Fish and Game
IHOT: Integrated Hatchery Operations Team
LSRCP: Lower Snake River Compensation Plan
NMFS: National Marine Fisheries Service
ODFW: Oregon Department of Fish and Wildlife
PAC: Production Advisory Committee
PNFHPC: Pacific Northwest Fish Health Protection Committee
PP&L: Pacific Power and Light
PUD: Public Utility District
StS: Summer Steelhead
StW: Winter Steelhead
SOC: Sockeye
TAC: Technical Advisory Committee
USFWS: U.S. Fish and Wildlife Service
WDF: Washington Department of Fisheries
WDW: Washington Department of Wildlife

Clearwater Hatchery

INTRODUCTION

Clearwater Hatchery is located on the north bank of the North Fork of the Clearwater River, downstream from Dworshak Dam. It is approximately 72 miles from Lower Granite Dam, and 504 miles from the mouth of the Columbia River. Site elevation is approximately 994 feet above sea level. The hatchery is staffed with 7 FTE's.

Clearwater Hatchery has two pipelines from Dworshak Reservoir. One is attached to a floating platform and is capable of providing various temperatures at varying depths. The other is a stationary intake about 245 feet below the top of the dam. All water is gravity fed to the hatchery. An 18-inch intake. pipe provides an estimated 10 cfs with temperature remaining constant at approximately 40°F. The primary 42-inch intake pipe can draw water from 5 to 45 feet in depth with temperatures ranging from 55° to 60°F and 70 cfs of flow.

The hatchery facility consists of 11 chinook raceways, 24 steelhead raceways, 2 adult holding ponds, a covered spawning area with 2 live wells and 60 concrete rearing vats. There are 40 double stacks of Heath-type incubators and each vat also has an incubation jar. All facility units are in excellent condition. Clearwater Hatchery also supports satellite facilities at Red River, Crooked River and Powell.

The Red River satellite facility is located approximately 15 miles east of Elk City, Idaho. It is approximately 186 miles upstream from Lower Granite Dam and 618 miles from the mouth of the Columbia River. It was first built in 1974 by the Columbia River Project and then remodeled by the U.S. Army Corps of Engineers in 1986.

Red River is supplied by gravity flow from an intake located at the bottom of the South Fork of Red River, 225 yards upstream from the facility. Water rights allow for 10 cfs and during low flows in the summer about 5 cfs is available. Temperatures range from 40°F in the spring to 71°F in early August. The facility consists of two adult holding ponds, a removable tripod and panel weir, and a rearing pond. All units are in good condition due to the recent remodeling.

The Crooked River satellite facility is located 20 miles downstream of Red River. The trap is located 0.5 miles upstream of the mouth of Crooked River, a tributary of the South Fork of the Clearwater River. The rearing ponds are 10 miles upstream from the Crooked River adult trap.

Crooked River water is supplied by gravity flow by an intake 200 yards upstream of the facility raceways. Water rights allow for 10 cfs at the rearing facility and 10 cfs at the trapping facility. Water temperatures range from 42° to 70°F. The trap and weir are located at the mouth of Crooked River. Ten miles upstream from the mouth are two

raceways, a cleaning waste pond and final settling pond. All facility units are in good condition.

The Powell satellite facility is located 122 miles east of the Clear-water Hatchery at the headwaters of the Lochsa River, the confluence of the Crooked Fork Creek and White Sands Creek. Powell is 192.5 miles from Lower Granite Dam and 624 miles from the mouth of the Columbia River.

The Powell Facility receives gravity flow water from Walton Creek at a rate of 7 cfs with the intake being located 100 yards upstream from the facility. Powell also has a pumped supply from White Sands Creek at 3 cfs. Water temperature ranges from 45.8° to 50.2°F from the Walton Creek intake and 41° to 65°F from the White Sands pump station.

The facility consists of one rearing pond, a diversion and intake screen, two adult holding ponds, a floating weir, and an open bay spawning shelter. All facility units are in good condition.

PURPOSE

Clearwater Hatchery was constructed in 1992. It is the final facility to be built by the U.S. Army Corps of Engineers as part of the Lower Snake River Compensation Plan (LSRCP)—a program to mitigate for anadromous fishery losses caused by the four federal dams constructed on the lower Snake River. The hatchery is used for rearing spring chinook and summer steelhead. Adult collection and spawning occurs at the satellite facilities. The satellite ponds are also used for final rearing and release of spring chinook.

GOALS

The LSRCP mitigation goals are to return 11,915 adult spring chinook and 14,000 adult steelhead above Lower Granite Dam, for the Clearwater River.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead
Produce 2.3 million smolts (350,000 pounds) for release in the Clearwater River drainage.

Spring Chinook
Produce 300,000 million smolts (15,000 pounds) for final rearing and on-station release at Red River satellite facility.

Produce 800,000 smolts (40,000 pounds) for final rearing and on-station release at Crooked River satellite facility.

Produce 300,000 smolts (15,000 pounds) for final rearing and on-station release at the Powell satellite facility.

Provide surplus eggs to other hatchery programs in the Clearwater River Basin.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Spring Chinook: Clearwater Hatchery has no adult collection facilities. However, the satellite facilities are equipped to trap, hold and spawn adult spring chinook. Eggs are transported to the hatchery for incubation and rearing. The intent of adult collection at the satellite facilities is to collect enough adults to maintain the hatchery mitigation program and supply eggs for other programs. Adults return to the satellite facilities from June through mid-September. Spawning occurs during August and early September. Because of poor smolt survival, there are seldom sufficient numbers of adults to meet the hatchery mitigation goals.

Summer Steelhead: Clearwater Hatchery has no adult collection facilities. Eggs are received from Dworshak National Fish Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Acclimating smolts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond.

Following are the specific rearing and release strategies used at this hatchery:

Spring Chinook

- Rear 300,000 fish to size of approximately 150 fish/pound and transfer to the Red River rearing pond for final rearing and release. Fish will be released on-station in October at a size of approximately 20 fish/pound. All fish will be marked prior to release.

- Rear 800,000 fish to size of approximately 150 fish / pound and transfer to the Crooked River rearing pond for final rearing and release. Fish will be released on-station in October at a size of approximately 20 fish / pound. All fish will be marked prior to release.

- Rear 300,000 fish to size of approximately 150 fish / pound and transfer to the Powell rearing pond for final rearing and release. Fish will be released on-station in October at a size of approximately 20 fish / pound. All fish will be marked prior to release.

Summer Steelhead

- Rear 2.3 million smolts to a size of approximately 6.5 fish / pound and release at various locations in the Clearwater River drainage during April. All fish will be marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Spring Chinook: Due to low numbers of returning adults, all spring chinook collected are used for basin-wide hatchery programs. Adults are mated randomly and gametes from the entire run are used. Adults are spawned at a 1:1 male to female ratio. Surplus eggs provided to other facilities are collected throughout the entire run to maximize genetic integrity.

Summer Steelhead: There are no adult steelhead collected at this facility. All eggs are received from Dworshak National Fish Hatchery.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.
- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.
- Use sanitation procedures which prevent introduction of pathogens into or within a facility.
- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at *Clearwater Hatchery and Satellites*

Health Monitoring

- At least monthly, each fish lot is given an extensive health exam.
- Prior to release, fish are given an extensive health exam.
- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.
- Adults are sampled for viral and bacterial pathogens throughout the spawning period.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics to control bacterial diseases.
- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.
- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.
- Anti-fungal compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.
- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.
- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.
- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 6: Communicate effectively with other fish producers, managers and the public.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: Communication between IDFG, the U.S. Fish and Wildlife Service and Nez Perce Tribe takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS—CLEARWATER HATCHERY AND SATELLITES

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	Spr. Chinook		NA	NA	
	S. Steelhead		NA	NA	
Adult Prespawning Survival	Spr. Chinook	90%	NA	NA	
	S. Steelhead	90%	NA	NA	
Egg-take	Spr. Chinook		NA	NA	
	S. Steelhead		NA	NA	
Green Egg-to-Fry Survival	Spr. Chinook	90%	NA	NA	
	S. Steelhead	90%	NA	NA	
Fry-to-Smolt Survival	Spr. Chinook	90%	NA	NA	
	S. Steelhead	90%	NA	NA	
Fish Releases	Spr. Chinook	1,400,000	NA	NA	
	S. Steelhead	2,300,000	NA	NA	
Egg Transfers	Spr. Chinook	Surplus	NA	NA	
	S. Steelhead	Surplus	NA	NA	
Fish Transfers	Spr. Chinook	Surplus	NA	NA	
	S. Steelhead	Surplus	NA	NA	
Adults Passed Upstream	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	
Percent Survival	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	

NA=Not applicable; this hatchery was constructed in 1992.

Objective 2

Measures	Species	Hatchery Goal 5-Year Average	Range	Constraints
Smolt Size at Release (fish/lb)	Spr. Chinook	20.0	NA	NA
	S. Steelhead	6.5	NA	NA
Acclimation	Spr. Chinook	Yes	NA	NA
	S. Steelhead	Yes	NA	NA
Volitional Release	Spr. Chinook	Yes	NA	NA
	S. Steelhead	No	NA	NA

Objective 3

Measures	Species	Hatchery Goal 5-Year Average	Range	Constraints
Collect Adults Throughout Run	Spr. Chinook	Yes	NA	NA
	S. Steelhead	Yes	NA	NA
Spawning Pop. >500	Spr. Chinook	Yes	NA	NA
	S. Steelhead	Yes	NA	NA
Spawning Ratio Male:Female	Spr. Chinook	1:1	NA	NA
	S. Steelhead	1:1	NA	NA

Objective 4

Measures	Species	Hatchery Goal 5-Year Average	Range	Constraints
Adhere to Disease Policy	Spr. Chinook	Yes	Yes	--
	S. Steelhead	Yes	Yes	--

Objective 5

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
TSS Effluent (net non-harvest)	All	NA	NA	NA	
TSS Max Effluent (net harvest)	All	NA	NA	NA	
SS Effluent	All	NA	NA	NA	

Constraints/Comments-Clearwater Hatchery

Hatchery operating constraints will not become evident until the hatchery has operated for several years.

Magic Valley Hatchery

INTRODUCTION

Magic Valley Hatchery is located on the Snake River, approximately 7 miles northwest of the town of Filer in the Snake River Canyon. Elevation of the facility is 3,000 feet above sea level. The facility is staffed with 4 FTE's.

The hatchery is located on the south shore of the Snake River while the Crystal Springs water supply is on the north side. Water is delivered to the hatchery by gravity flow at an average flow rate of 125 cfs (51,000 gpm). Water temperature is a constant 58°F from Crystal Springs.

The hatchery rearing units consist of 32 raceways, 20 starting tanks and upwelling incubators. All units are in good condition.

PURPOSE

Magic Valley Hatchery was constructed in 1987 by the U.S. Army Corps of Engineers as part of the Lower Snake River Compensation Plan (LSRCP)—a program to mitigate for anadromous fishery losses caused by the four federal dams constructed on the lower Snake River. The hatchery is funded by the U.S. Fish and Wildlife Service and operated by the Idaho Department of Fish and Game. This facility is used for egg incubation and rearing of summer steelhead. No adult fish are collected at this facility, eyed-eggs are received from other hatcheries. Fish are reared at Magic Valley Hatchery and then released off-station into various Salmon River tributaries.

GOALS

The LSRCP mitigation goal is to return 11,660 adult steelhead above Lower Granite Dam.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead
Produce 2.0 million "A" and "B" strain smolts (400,000 pounds) for release into the Salmon River and its tributaries.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 4: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 5: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

No adults are collected at this facility. The hatchery receives approximately 2.5 million eyed steelhead eggs from other hatcheries each year.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks can be used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies can also be used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Summer Steelhead: Rear 2.0 million "A" and "B" steelhead smolts to a size of 5 fish/pound and release into the Salmon River during the month of April. All fish are marked prior to release. Hatchery operation goals are to not exceed 0.30 density index and 1.25 flow index during rearing.

Objective 3: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.
- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.
- Use sanitation procedures which prevent introduction of pathogens into or within a facility.
- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at Magic Valley Hatchery

Health Monitoring

- At least monthly, each fish lot is given an extensive health exam.
- Prior to release, fish are given an extensive health exam.
- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.

Therapeutic and Proohvlactic Treatments

- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.
- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.
- Anti-fungal compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.
- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.
- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.
- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 4: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 5: Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: Communication between IDFG and the U.S. Fish and Wildlife Service takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS-MAGIC VALLEY HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Ranee	Constraints
Adult Capture	S. Steelhead	NA	NA	NA	
Adult Prespawning Survival	S. Steelhead	NA	NA	NA	
Egg-take	S. Steelhead	NA	NA	NA	
Eggs Received	S. Steelhead	2,500,000	2,605,982	2.4-2.8 million	
Eyed Egg-to-Fry Survival	S. Steelhead	90%	91%	74-99%	
Fry-to-Smolt Survival	S. Steelhead	90%	90%	75-92%	
Fish Releases	S. Steelhead	2,000,000	2,155,700	2,062K-2,286K	
Egg Transfers	S. Steelhead	0	0	0	
Fish Transfers	S. Steelhead	0	0	0	
Adults Passed Upstream	S. Steelhead	NA	NA	NA	
Percent Survival	S. Steelhead	1%	Unknown	Unknown	

NA=Not applicable.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Smolt Size at Release (fish/lb)	S. Steelhead	4.5	4.3	4.1-4.5	
Acclimation	S. Steelhead	No	No	--	
Volitional Release	S. Steelhead	No	No	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	NA	NA	NA	
TSS Max Effluent	All	100 mg/l daily max.	125 mg/l	0.3-3.3 mg/l	
SS Effluent	All	1.0 ml/l	<0.1 ml/l	<0.05-0.1 ml/l	

McCall Hatchery

INTRODUCTION

McCall Hatchery is located within the city limits of McCall, Idaho on the North Fork Payette River, approximately 0.25 miles downstream from Payette Lake. Site elevation is 4,980 feet above sea level. The hatchery is staffed with 3 FTE's. An adult summer chinook trapping and spawning satellite facility is located on the South Fork Salmon River near Warm Lake, approximately 26 miles east of Cascade, Idaho.

Water is supplied to the hatchery from Payette Lake through two inlets, one at the lake surface and the other at a depth of 50 feet. This permits some control over water temperatures throughout the year. Water flow to the hatchery is 8,977 gpm gravity flow with water temperatures that range from 37°F in winter to 53°F during mid-summer (average 43°F). The satellite facility utilizes 8,977 gpm of gravity flow water from the South Fork of the Salmon River. Water temperatures at this facility range from 43°F in the winter to 70°F in late summer (average 55°F).

Rearing facilities at the main hatchery are in good condition and consist of 14 indoor rearing tanks, 2 outdoor rearing ponds, and 23 stacks of 8-tray Heath incubators. The satellite facility has two adult holding ponds, a removable fish weir, a fish ladder and trap, and a covered spawning area. All are in good condition.

PURPOSE

McCall Hatchery was constructed in 1979 by the U.S. Army Corps of Engineers as part of the Lower Snake River Compensation Plan (LSRCP)—a program to mitigate for anadromous fishery losses caused by the construction of the four hydroelectric dams on the lower Snake River. It was the first hatchery built to enhance the salmon runs into Idaho authorized by Congress through the Water Resources Development Act of 1976. The hatchery is funded by the U.S. Fish and Wildlife Service and operated by Idaho Department of Fish and Game. It is used for egg incubation and rearing summer chinook. Adult summer chinook are trapped and held at the satellite facility; all eggs are shipped to McCall Hatchery.

GOALS

The LSRCP mitigation goal is to return 8,000 adult summer chinook above Lower Granite Dam.

OBJECTIVES

Objective 1: Hatchery Production

Summer Chinook
Produce 1.0 million smolts (50,000 pounds) for release into the South Fork Salmon River.

Provide surplus summer chinook eggs and/or fish to other hatchery programs in the state.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

The intent of adult collection procedures at McCall Hatchery is to collect enough summer chinook adults to maintain the hatchery production goals and supply any surplus eggs to other basin-wide programs. Adult summer chinook return to the trapping facility on the South Fork Salmon River from late June through mid-September and are held there until they are spawned during August and early September. There are usually a sufficient number of eggs taken to meet the hatchery mitigation goals and supply other programs. At least one-third (by sex) of all returning adults are released above the weir for natural spawning.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Acclimating smolts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond.

Following are the specific rearing and release strategies used at this hatchery:

Summer Chinook: Rear 1 million smolts to a size of approximately 20 fish / pound; release off-station at Knox Bridge on the South Fork of the Salmon River from late March through the first of April. All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

All summer chinook collected are used for basin-wide hatchery programs. Adults are collected throughout the entire run. At least one-third of the fish (by sex) are released upstream for natural spawning. Adults are mated randomly using a 1:1 male to female ratio. Gametes from the entire run are used. Surplus eggs provided to other facilities are collected throughout the entire run to maximize genetic integrity.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.

- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.

- Use sanitation procedures which prevent introduction of pathogens into or within a facility.

- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at McCall Hatchery and East Fork Satellite

Health Monitoring

- At least monthly, each fish lot is given an extensive health exam.

- Prior to release, fish are given an extensive health exam.

- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.

- Adults are sampled throughout the spawning period for viral and bacterial pathogens.

Therapeutic and Prophylactic Treatments

- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.

- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.

- Anti-fungal compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.

- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.

- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.

- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 6: Communicate effectively with other fish producers, managers and the public.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. MOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: Communication between IDFG and the U.S. Fish and Wildlife Service takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS—MCCALL HATCHERY AND SATELLITE

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Ranee	Constraints
Adult Capture	Sum. Chinook	8,000	1,673	938-2,848	4
Adult Prespawning Survival	Sum. Chinook	90%	77.7%	69.7-94.0%	1,2
Egg-take	Sum. Chinook	1,400,000	1,375,984	704K-2,834K	1,4
Green Egg-to-Fry Survival	Sum. Chinook	90%	90.9%	84.4-97.2%	3,5
Fry-to-Smolt Survival	Sum. Chinook	90%	89.5%	81.1-97.1%	4
Fish Releases	Sum. Chinook	1,000,000	1,211,161	709K-1,732K	1
Egg Transfers	Sum. Chinook	Surplus	--[1]	--[1]	
Fish Transfers	Sum. Chinook	0	0	0	
Adults Passed Upstream	Sum. Chinook	1/3 of adults trapped	699	237-l ,802	1,6
Percent Survival	Sum. Chinook	--	Unknown	Unknown	

NA=Not applicable.
[1] Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal 5-Year Average		Ranee	Constraints
Smolt Size at Release (fish/lb)	Sum Chinook	m	21.6	18.7-23.8	
Acclimation	Sum Chinook	No	No	--	
Volitional Release	Sum Chinook	No	No	--	

Objective 3

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraint5
Collect Adults Throughout Run	Sum. Chinook	Yes	Yes	--	
Spawning Pop. >500	Sum. Chinook	Yes	735	274-1,507	
Spawning Ratio Male:Female	Sum. Chinook	1:1	1:1	--	

Objective 4

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
Adhere to Disease Policy	Sum. Chinook	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal 5-Year Averaee		Range	Constraints
TSS Effluent (net value)	All	5.0 mg/l	0.054 mg/l	-0.7-0.7 mg/l	
TSS Max Effluent (gross value)	All	5.0 mg/l	0.66 mg/l	0.1-1.2 mg/l	
SS Effluent (bimonthly)	All	0.1 ml/l	<0.1 ml/l	<0.1 ml/l	

Cons train ts/Commen ts--McCall Hatchery

1. Poor adult survival due to high river water temperatures.
2. Handling stress during transport from the trap to holding ponds and during routine checks for ripeness.
3. Cold river temperatures during early rearing.
4. Mortality in reservoirs during smolt and adult migration.
5. Reduced green egg-to-fry survival due to handling stress caused by transporting fish from spawning facility to the hatchery.
6. Increased mortality due to handling stress and high river water temperatures.
7. Historically, a higher number of returning females resulted in some males being spawned more than once.

Niagara Springs Steelhead Hatchery

INTRODUCTION

Niagara Springs Steelhead Hatchery is located in the Snake River Canyon, 10 miles south of the town of Wendell, Idaho. Elevation of the facility is 3,000 feet above sea level. The facility is staffed with 4 FTE's.

The hatchery's water supply is by gravity flow from Niagara Springs, with a constant water temperature of 58°F. Flow increases from 30 cfs in June to 120 cfs in March. Water (120 cfs) may also be diverted from the spring since the Rim View Hatchery diversion is above the diversion for this hatchery.

The hatchery consists of 14 raceways (300' x 10' x 3'); seven of these set up to accommodate 15-foot nursery inserts providing a total of 2,450 cubic feet of early fry rearing space. The inserts are removed after the fry stage and ponds are used as standard raceways. Twenty upwelling incubators and 20 circular vats are also used during hatching and early rearing. All facility units are in fair to good condition.

PURPOSE

Niagara Springs is owned and financed by Idaho Power Company as required under the terms of their Federal Energy Regulatory Commission license for the operation of the Hells Canyon hydroelectric complex. The facility is operated by Idaho Department of Fish and Game. The purposes of the hatchery are to (1) mitigate for losses in production and fishing opportunity resulting from construction of hydroelectric dams in Hells Canyon, (2) relocate a portion of the Snake River steelhead run into the Salmon River, and (3) enhance the steelhead run in the Snake River below Hells Canyon Dam. No steelhead adults are collected or spawned at this facility. Eggs are transferred in from other hatcheries for incubation and rearing. Half the production is released into the Snake River below Hells Canyon Dam. The remaining production is released in different locations in the upper and lower Salmon River.

GOALS

The Idaho Power Company's mitigation goals are to (1) enhance the steelhead run in the Snake River below Hells Canyon Dam, and (2) relocate part of this run to the Salmon River and its tributaries.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead
Produce 900,000 smolts (200,000 pounds) for release into the Salmon River and its tributaries.

Produce 900,000 smolts (200,000 pounds) for release in the Snake River below Hells Canyon Dam.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 4: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 5: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

No adults are collected at this facility; eggs are transferred in from other hatcheries. Hatchery rearing conditions (i.e., hatchery design and size, water availability, and water quality conditions) are currently limiting hatchery production to 250,000 pounds.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and *Release Strategies*

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Acclimating smolts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond.

Following are the specific rearing and release strategies used at this hatchery:

Summer Steelhead

- Rear 900,000 smolts to a size of 4.5 fish/pound and release off-station into the upper Salmon River in early April. All fish are marked prior to release.
- Rear 900,000 smolts to a size of 4.5 fish/pound and release off-station into the Snake River below Hells Canyon Dam in late April. All fish are marked prior to release.

Objective 3: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.
- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.
- Use sanitation procedures which prevent introduction of pathogens into or within a facility.
- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at Niagara Springs Steelhead Hatchery

Health Monitoring

- At least monthly, each fish lot is given an extensive health exam.
- Prior to release, fish are given an extensive health exam.
- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.

Therapeutic and Prophylactic Treatments

- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.
- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.
- Anti-fungal compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.
- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.
- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.
- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 4: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 5: Communicate effectively with other fish producers, managers and the public.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. *v.* Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: Communication between IDFG, the U.S. Fish and Wildlife Service and Idaho Power Company takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS-NIAGARA SPRINGS HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	S. Steelhead	NA	NA	NA	
Adult Prespawning Survival	S. Steelhead	NA	NA	NA	
Egg-take	S. Steelhead	NA	NA	NA	
Eggs Received	S. Steelhead	2,300,000	2,370,000	2,000K-2,900K	1
Eyed Egg-to-Fry Survival	S. Steelhead	90%	86%	74-92%	2,6,7
Fry-to-Smolt Survival	S. Steelhead	95%	84%	74-97%	2,3,4,5,7
Fish Releases	S. Steelhead	1,800,000	1,710,000	1,450K-1,900K	1-8
Egg Transfers	S. Steelhead	0	0	0	
Fish Transfers	S. Steelhead	0	0	0	
Adults Passed Upstream	S. Steelhead	NA	NA	NA	
Percent Survival	S. Steelhead	--	unknown	Unknown	

NA=Not applicable.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Smolt Size at Release (fish/lb)	S. Steelhead	4.5	4.12	3.65-4.43	2,3,5,7
Acclimation	S. Steelhead	No	No	--	
Volitional Release	S. Steelhead	No	No	--	

Objec ive 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	1,3,5,6,7

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	85% removal	89.7%	67.5-99.9%	8
TSS Max Effluent	All	100 mg/l daily	11.25 mg/l	0.9-107.5 mg/l	8
SS Effluent	All	90% removal daily (1.0 mg/l max)	97.2% 0.134 mg/l	70-100% O-25 mg/l	8

Cons train ts/Commen ts--Niagara Springs Hatchery

1. Spawning station has insufficient number of eggs.

2. Water quantity and quality from spring has deteriorated with prolonged drought.

3. Environmental stress of high densities with corresponding bacterial, fungal, and viral epizootics can be expected.

4. Predation during outside rearing.

5. Introduction of disease pathogens by avian predators and environmental introduction through intake from neighboring hatcheries.

6. Early rearing conditions are deficient because of lack of space and low water volumes.

7. Disease losses due to viruses and lack of virus-control methods.

8. Effluent from the hatchery exceeds the capacity of the settling pond.

Oxbow Hatchery

INTRODUCTION

Oxbow Hatchery is located in Oregon near the Oxbow hydroelectric facility on the Snake River. Facility elevation is 1,689 feet above sea level. The facility is staffed with 1 FIE.

Water used at Oxbow Hatchery is obtained by pumping it from either the Snake River or an on-site well. Two production pumps produce approximately 15 cfs (6,750 gpm). Two incubation wells produce another 0.25 cfs (100 gpm) each for a total of 200 gpm. River water temperatures range from a winter low of 33°F to a late summer high of 75°F (average of 54°F). One incubation well's water temperature is 52°F and the other incubation well is 56°F.

Hatchery facilities include 4 adult holding ponds, 6 raceways, and 14 double-stack incubators. Adult fish are trapped at Hells Canyon Dam and transported, via tank truck, 23 miles upstream to Oxbow Hatchery. The hatchery facilities are in poor to fair condition with raceways in need of major repair or replacement.

PURPOSE

Oxbow Hatchery began operating in 1962 as part of the Idaho Power Company's mitigation for fishery losses caused by construction of hydroelectric dams on the Snake River in Hells Canyon. Facilities are owned and funded by Idaho Power Company, but operated by Idaho Department of Fish and Game. The hatchery is utilized for trapping sufficient numbers of returning adult summer steelhead and spring chinook to fulfill Idaho Power's anadromous fish mitigation requirements. Smolts are not normally reared or released at this facility.

GOALS

Mitigation goals are to (1) produce 1.5 million eyed steelhead eggs to be shipped to Niagara Springs Fish Hatchery, and (2) ship all adult spring chinook trapped to Rapid River Fish Hatchery.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead
Trap and spawn adult steelhead; incubate eggs to the eyed stage for transfer to other hatcheries.

Rear available excess steelhead eggs to the fry stage for release in the Snake and Salmon River basins.

Spring Chinook
Trap and hold returning adults for eventual transfer to the Rapid River Hatchery.

Objective 2: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 3: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 4: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 5: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Summer Steelhead: The intent of adult collection procedures at Oxbow Hatchery is to collect enough steelhead adults to maintain the hatchery production goals and supply any surplus eggs to other basin-wide programs. Adult steelhead are trapped from the first of October through December, then again from March through April. Fish are held at the hatchery until they are spawned. Spawning occurs from the end of March through April. There is usually a sufficient number of eggs taken to contribute to hatchery production goals for Idaho Power's mitigation responsibility.

Spring Chinook: The intent of spring chinook adult collection is to transfer all trapped fish to Rapid River Hatchery for spawning and rearing.

Objective 2: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

All steelhead collected are used for basin-wide programs. Adults are mated randomly and gametes from the entire run are used. Adults are spawned at a 1:1 male to female ratio provided sufficient numbers are available. Surplus eggs provided to other facilities are collected throughout the entire run to maximize genetic integrity.

Objective 3: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.
- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.
- Use sanitation procedures which prevent introduction of pathogens into or within a facility.
- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at Oxbow Hatchery

Health Monitoring

- Adult broodstock are examined periodically for disease pathogens.
- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.
- Adults are sampled for viral and bacterial pathogens throughout the spawning period.

Therapeutic and **Prophylactic** Treatments

- Adult spring chinook and steelhead are injected with antibiotics for the control of bacterial diseases.
- Eggs are held in separate family units until disease status known. Viral-positive eggs are culled.
- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.
- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.
- **Anti-fungal** compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.
- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.
- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.
- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 4: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 5: Communicate effectively with other fish producers, managers and the public.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. MOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. *v.* Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: Communication between IDFG, Oregon Department of Fish and Wildlife, the U.S. Fish and Wildlife Service and Idaho Power Company takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS-OXBOW HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	Spr. Chinook	Supplement Rapid River Hatchery Adult Returns	300	22-912	1,2,11
	S. Steelhead	Fall 1,200 spring400	2,170	1,151-2,729	1,2,11
Adult Prespawning Survival	Spr. Chinook	90%	86%	78-97%	2,3,4,5,7
	S. Steelhead	>90%	85.2%	64.7-96.0%	2,3,4,5,7
Egg-take	Spr. Chinook	NA	NA	NA	
	S. Steelhead	1,500,000	2,900,000	1.3-4.9 million	6,8
Green Egg-to-Fry Survival	Spr. Chinook	NA	NA	NA	
	S. Steelhead	>90%	58.6%	5.1-86.8%	6,9,10
Fry-to-Smolt Survival	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	
Fish Releases	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	
Egg Transfers	Spr. Chinook	NA	NA	NA	
	Steelhead	NA	NA	NA	
Fish Transfers	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	
Adults Rack to River	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	
Percent Survival	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	

NA=Not applicable.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	Spr. Chinook	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
Spawning Pop. >500	Spr. Chinook	No	No	--	
	S. Steelhead	Yes	Yes	--	
Spawning Ratio Male:Female	Spr. Chinook	1:1	1:1	0.8:1 -1:1	12,13
	S. Steelhead	1:1	0.9:1	0.4:1-1.2:1	

Objective 3

Measures	Species	Hatchery Goal	5-Year Averaee	Range	Constraints
Adhere to Disease Policy	Spr. Chinook	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Ranee	Constraints
TSS Effluent	All	NA	NA	NA	
TSS Max Effluent	All	NA	NA	NA	
SS Effluent	All	NA	NA	NA	

Cons train ts/Commen ts-Oxbo w Hatchery

1. Poor attraction water; fish attracted to water flow at turbine outlets.
2. Poor survival of adults due to high water temperatures
3. Handling stress during fish loading, during transport to fish trap and during routine checks for ripeness.
4. *Certomyxa shasta* and *Aeromonas* pseudomonas infections associated with high river water temperatures.
5. Injuries to adults during upriver migration.
6. High water temperatures during the adult holding period affects egg quality.
7. Water quality standards at or above maximum limits for salmonid aquaculture.
8. Egg culling due to viral diseases attributed to positive disease results of spawned females.
9. Facility design exposes green eggs to adverse environmental conditions during spawn collection.
10. Internal organ damage to adults from handling stress during routine checks for ripeness.
11. High water flows inhibit or prohibit adult collection facility operations.
12. Male fish tend to become sexually mature later than female fish.
13. Handling stress during routine checks for ripeness causes elevated prespawning mortality.

Pahsimeroi Hatchery

INTRODUCTION

Pahsimeroi Hatchery is located on the Pahsimeroi River near Ellis, Idaho. The hatchery is divided into two locations with the lower facility 1 mile upstream and upper facility 7 miles upstream from the river mouth. Elevation of the lower facility is 4,669 feet and the upper site is 4,760 feet above sea level. The facility is staffed with 2 FTE's.

The main hatchery receives its water directly from the Pahsimeroi River using both gravity and pump delivery methods. Temperatures vary from 32°F in winter to 67°F in the summer (average 48°F). Water flows are 17,953 gpm (40 cfs). Water is also obtained from a series of nearby springs (0.5 cfs) which have a temperature variance from 52°F in winter to 55°F in summer (average of 54°F).

The main hatchery facility contains an adult trap with three concrete pens, spawning area, a 55-foot long weir crossing the Pahsimeroi River, four concrete raceways (4' x 100') used for early rearing of salmon and steelhead fry, and an egg incubation area. Facilities are in fair condition.

The satellite rearing facility is in good condition and consists of two earthen rearing ponds (40' x 300') used to rear summer chinook fingerlings. River flows here vary from 10 to 16 cfs depending on time of year.

PURPOSE

The hatchery began operation in 1969. It is owned and funded by Idaho Power Company as mitigation for fishery losses caused by construction of hydroelectric dams on the Snake River in Hells Canyon. The hatchery is used for adult collection and spawning of summer steelhead (eggs are shipped to other hatcheries for fish rearing and release). This facility is also used for adult collection, spawning, rearing and release of summer chinook.

GOALS

To relocate steelhead and chinook salmon runs from the Snake River (which was blocked by Hells Canyon, Oxbow and Brownlee dams) to the Salmon River drainage.

OBJECTIVES

Objective I: Hatchery Production

Summer Chinook
Produce 1 million smolts for release into the Pahsimeroi River and Salmon River drainage.

Provide surplus eggs to other hatchery programs in the state.

Summer Steelhead
Provide green and eyed eggs to Niagara, Magic Valley and Hagerman hatcheries.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective *4:* Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Summer Chinook: The intent of spring chinook adult collection procedures at Pahsimeroi Hatchery is to trap all adult summer chinook and release at least one-third (by sex) of the fish upstream for natural production. Adult summer chinook return to the hatchery from June through September and are held at the hatchery until they are spawned. Spawning occurs during August and September. because of low numbers of returning adults, there are seldom sufficient adults to meet the hatchery mitigation goals.

Summer Steelhead: The intent of adult collection procedures is to trap all steelhead and release all wild fish upstream for natural production. Adult steelhead return to the hatchery from late February through mid-May and are held at the hatchery until they are spawned. Spawning occurs from early March to mid-May. There are usually sufficient numbers of adults collected to meet the hatchery mitigation goals and supply surplus eggs for other programs in the basin.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Acclimating smolts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond.

Following are the specific rearing and release strategies used at this hatchery:

Summer Chinook: Rear 1 million smolts to a size of approximately 20 fish / pound and release on-station from mid-March through the first of April. All fish are marked prior to release.

Summer Steelhead: There is no extended rearing of steelhead at this facility. Eggs are incubated for a short period and then transferred to other facilities.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Summer Chinook: All summer chinook collected are used for basin-wide programs. Adults are mated randomly using a 1:1 male to female ratio and gametes from the entire run are used. Surplus eggs provided to other facilities are collected throughout the entire run to maximize genetic integrity,

Summer Steelhead: All hatchery steelhead collected are used for basin-wide hatchery programs. Adults are mated randomly and gametes from the entire run are used. The goal is to spawn adults at a 1:1 male to female ratio. However, the spawning ratio is often skewed and some males are used more than once. Surplus eggs provided to other facilities are collected throughout the entire run to maximize genetic integrity.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.

- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.

- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.

- Use sanitation procedures which prevent introduction of pathogens into or within a facility.

- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at Pahsimeroi Hatchery

Health Monitoring

- At least monthly, each fish lot is given an extensive health exam.

- Prior to release, fish are given an extensive health exam.

- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.

- Adults are sampled for viral and bacterial pathogens throughout the spawning period.

Therapeutic and Prophylactic Treatments

- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.

- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.

- Anti-fungal compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.

- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.
- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.
- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 6: Communicate effectively with other fish producers, managers and the public.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisor-y Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatcher-y Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: In-season communication between IDFG, Oregon Department of Fish and Wildlife, the U.S. Fish and Wildlife Service and Idaho Power Company takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS-PAHSIMEROI HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	Sum. Chinook	750	405	131-838	1-9
	S. Steelhead	100% of run	1,689	719-2,092	
Adult Prespawning Survival	Sum. Chinook	100%	94.3%	79.8-98.8%	
	S. Steelhead	100%	99.3%	98.0-99.9%	
Egg-take	Sum. Chinook	1,250,000	527,746	172K-1,072K	10
	S. Steelhead	9,000,000	4,586,103	1,856K-5,847K	
Green Egg-to-Fry Survival	Sum. Chinook	90%	90.8%	82.0-95.0%	
	S. Steelhead	NA	NA	NA	
Fry-to-Smolt Survival	Sum. Chinook				
	S. Steelhead	NA	NA	NA	
Fish Releases	Sum. Chinook	1,000,000	701240	228K-1,058K	1,2,3,4,5,10
	S. Steelhead	NA	NA	NA	
Egg Transfers	Sum. Chinook	NA	NA	NA	
	S. Steelhead	All	NA	NA	
Fish Transfers	Sum. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	
Adults Passed Upsteam	Sum. Chinook	1/3 of adults trapped	122 30.1%	43-260 23.6-32.8%	
	S. Steelhead	NA	NA	NA	
Percent Survival	Sum. Chinook	0.5%	0.31%	0.02-0.75%	1,2,6,7,8,9
	S. Steelhead	NA	NA	NA	

NA=Not applicable.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Smolt Size at Release (fish/lb)	Sum Chinook	20.0	15.8	15.2-16.9	
	S. Steelhead	NA	NA	NA	
Acclimation	Sum Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	
Volitional Release	Sum Chinook	Yes	Yes	--	
	S. Steelhead	NA	NA	NA	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	Sum. Chinook	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
Spawning Pop. >500	Sum. Chinook	Yes	No	--	
	S. Steelhead	Yes	Yes	--	
Spawning Ratio Male:Female	Sum. Chinook	1:1	0.94:1	1:1-0.7:1	8,9,10
	S. Steelhead	1:1	1:1	1:1	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	Sum. Chinook	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
TSS Effluent (net non-harvest)	All	<15.5 mg/l	3.82 mg/l	-3.5-16.2 mg/l	
TSS Max Effluent (net harvest)	All	<15.5 mg/l	-1.8 mg/l	-14.5-13.0 mg/l	
SS Effluent	All	<0.1 ml/l	<0.1 ml/l	<0.1 ml/l	

Constraints/Comments-Pahsimeroi Hatchery

1. Poor river flows due to prolonged drought have impacted the smolt migration in the Salmon and Snake rivers.
2. Whirling disease has impacted the quality of smolts and adult fish.
3. Heavy silt load is affecting fry production in the Pahsimeroi River during winter months.
4. Constant bird predation in the rearing ponds.
5. Predation and harassment by otter while in the rearing pond.
6. Predation in lower Snake and Columbia rivers during migration.
7. Low river flows through lower Snake River to pass smolts.
8. Fish harvests in the ocean and lower Columbia River.
9. Low river flows and warm temperatures during summer adult passage.
10. Insufficient adult returns for egg-take.

Rapid River Hatchery

INTRODUCTION

Rapid River Hatchery is located along Rapid River in the lower Snake River Basin near Riggins, Idaho. It is approximately 606 river miles from the mouth of the Columbia River at an elevation of 2,185 feet above sea level. The hatchery is staffed with 3 FTE's.

Rearing units are in poor to good condition and consist of 12 raceways, 5 rearing ponds and 3 adult holding ponds. A fish barrier and trap are located approximately 1.5 miles downstream from the hatchery.

Water is supplied to the hatchery from Rapid River. All water is gravity flow with the hatchery receiving 12,567 gpm and the trap receiving 8,348 gpm.

PURPOSE

Rapid River Hatchery was constructed in 1964 to mitigate for fishery losses caused by Idaho Power Company's construction of hydroelectric dams on the Snake River in Hells Canyon. The hatchery is used for adult collection, egg incubation and rearing of spring chinook. It also provides surplus spring chinook eggs to other hatchery programs in the basin.

GOALS

The mitigation agreement with Idaho Power Company requires an annual production of 3 million spring chinook smolts.

OBJECTIVES

Objective 1: Hatchery Production

Spring Chinook
Produce 2.5 million smolts for on-station release.

Produce 500,000 smolts for release into the Snake River below Hells Canyon Dam.

Provide surplus eggs to other hatchery programs in the basin.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Spring Chinook: The intent of adult collection procedures at Rapid River Hatchery is to collect enough spring chinook adults to maintain the hatchery production goals and supply any surplus eggs to other basin-wide programs. Adult spring chinook return to the hatchery from mid-April through mid-September and are held at the hatchery until they are spawned. Spawning occurs during August and early September. There are usually a sufficient number of eggs taken to meet the hatchery production goals and supply the other facilities.

Summer Chinook: A native run of summer chinook is also trapped at Rapid River Hatchery. These fish usually arrive from early July through mid-September. These fish are distinguished from spring chinook through morphological characteristics and are released above the trap to spawn naturally in Rapid River.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Acclimating smolts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond.

Following are the specific rearing and release strategies used at this hatchery:

Spring Chinook

- Rear 2.5 million fish to a size of approximately 20 fish / pound and release on-station from mid-March through the first of April. All fish are marked prior to release.

- Rear 500,000 fish to a size of approximately 20 fish/pound and release off-station into the Snake River directly below Hells Canyon Dam in late March. All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Due to low numbers of returning adults, all spring chinook collected are used for basin-wide hatchery programs. Adults are mated randomly and gametes from the entire run are used. Adults are spawned at a 1:1 male to female ratio. Surplus eggs provided to other facilities are collected throughout the entire run to maximize genetic integrity. Native summer chinook collected at the trap are released above the trap to spawn naturally.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.

- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.

- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.

- Use sanitation procedures which prevent introduction of pathogens into or within a facility.

- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at Rapid River Hatchery

Health Monitoring

- At least monthly, each fish lot is given an extensive health exam.

- Prior to release, fish are given an extensive health exam.

- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.

- Adults are sampled for viral and bacterial pathogens throughout the spawning period.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics to control bacterial diseases.

- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.

- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.

- Anti-fungal compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.

- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.

- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.

- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 6: Communicate effectively with other fish producers, managers and the public.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor

regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements; State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: Communication between IDFG, Oregon Department of Fish and Wildlife, the U.S. Fish and Wildlife Service and Idaho Power Company takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS-RAPID RIVER HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Averaee	Range	Constraints
Adult Capture	Spr. Chinook	2,450	2,895	1,913-4,344	
Adult &spawning Survival	Spr. Chinook	>90%	80.5%	69690.4%	1,2,3,4
Egg-take	Spr. Chinook	4,000,000	4,886,716	2,553K-7,906K	
Green Egg-to-Fry Survival	Spr. Chinook	>90%	89.6%	86.5-92.9%	5
Fry-to-Smolt Survival	Spr. Chinook	>95%	88.7%	81.8-96.1%	6,7
Fish Releases	Spr. Chinook	3,000,000	3,090,680	2,820K-3,322K	
Egg Transfers	Spr. Chinook	Surplus	--[1]	--[1]	
Fish Transfers	Spr. Chinook	NA	NA	NA	
Adults Passed Upsteam	Spr. Chinook	NA	NA	NA	
Percent Survival	Spr. Chinook	>0.5%	0.116%	0.063-0.125%	8,9,10

NA=Not applicable.
[1] Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Smolt Size at Release (fish/lb)	Spr. Chinook	20.0	22.7	19.2-26.2	
Acclimation	Spr. Chinook	Yes	Yes	--	
Volitional Release	Spr. Chinook	Yes	Yes	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	Spr. Chinook	Yes	Yes	--	
Spawning Pop. >500	Spr. Chinook	Yes	Yes	--	
Spawning Ratio Male:Female	Spr. Chinook	1:1	1:1	1:1	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	Spr. Chinook	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
TSS Effluent (Harvest)	All	NA	6.24 mg/l	2312.2 mg/l	
TSS Max Effluent (Non-harvest)	All	5.0 mg/l (monthly)	226 mg/l	1.5-3.4 mg/l	11
SS Effluent	All	<0.1 ml/l	<0.1 ml/l	<0.1 ml/l	11

Constraints/Comments-Rapid River Hatchery

1. Stress on adults during transport from the trap.
2. Design of holding pond results in stress on adults during sorting and handling during spawning.
3. Design of holding pond does not allow for segregation or easy accessibility to adults.
4. Elevated mortalities of adults during the holding period due to warm water temperatures.
5. Incubation and rearing water contains large amounts of sediment.
6. Raceways can not be dried out or properly disinfected.
7. Cold water temperatures slow fry development.
8. Survival limited by sport and tribal fisheries.
9. Survival is limited by downstream harvest.
10. Mortality in reservoirs during smolt and adult migration.
11. Hatchery does not have a viable settling pond.

Sawtooth Hatchery

INTRODUCTION

Sawtooth Hatchery is located along the upper Salmon River near Stanley, Idaho. It is approximately 897 river miles from the mouth of the Columbia River at an elevation of 6,480 feet above sea level. A satellite facility is located on the East Fork Salmon River to trap adult chinook salmon and steelhead. Sawtooth Hatchery is staffed with 5 FTE's.

Water is supplied to the hatchery by gravity flow from the Salmon River and also pumped from three wells. Water from the river utilizes 15,709 gpm and the wells produce 4,039 gpm for incubation and early rearing. Water at the satellite facility is gravity flow from the East Fork Salmon River at 6,732 gpm (15 cfs) and is used for adult holding and trapping.

The hatchery consists of 100 stacks of incubators, 16 indoor rearing vats, 12 outside fry raceways, 28 final rearing raceways, a weir, fish trap, 3 adult holding ponds and a spawning area. The adult fish facility on the East Fork Salmon River consists of a weir, fish trap, three adult holding ponds and a spawning area located at the upper end of the holding ponds. No juvenile rearing occurs at the East Fork trap. All facility units are in good condition.

PURPOSE

Sawtooth Hatchery was constructed in 1984-85 as part of the Lower Snake River Compensation Plan-a program to mitigate for anadromous fishery losses caused by the construction of four hydroelectric dams on the lower Snake River. The hatchery is used for adult collection, egg incubation and rearing of spring chinook as well as adult collection and egg incubation of steelhead. The satellite facility is used for trapping and holding of adult chinook and steelhead (all eggs collected are shipped to Sawtooth Hatchery). Eyed steelhead eggs are shipped to hatcheries in southern Idaho where they are reared to smolts and returned to the upper Salmon River for release.

GOALS

The LSRCP mitigation goal is to return 19,445 spring chinook adults above Lower Granite Dam.

OBJECTIVES

Objective 1: Hatchery Production

Spring Chinook

Produce 1.6 million smolts (80,000 pounds) for on-station release.

Produce 700,000 smolts (35,000 pounds) for release into the East Fork Salmon River.

Provide surplus eggs to other hatchery programs in the basin.

Summer Steelhead

Trap and spawn adult steelhead to provide eggs to other hatcheries for the Lower Snake River Compensation Plan programs.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Spring Chinook: The intent of adult collection procedures at Sawtooth Hatchery and the East Fork Satellite facility is to trap all returning adults and release at least one-third (by sex) upstream for natural spawning. Adult spring chinook return to the hatchery from mid-June through mid-September. Spawning occurs during August and early September. Because of low numbers of returning adults, there are seldom sufficient numbers of adults to meet hatchery mitigation goals.

Summer Steelhead: The intent of adult collection procedures at Sawtooth Hatchery and satellite facility is to trap and retain returning hatchery fish and release all wild/natural fish upstream for natural spawning. Adults return from early March through the end of April. Spawning occurs from the end of March through April. Eggs are held at the hatchery until they reach the eyed-stage. They are then shipped to other hatcheries for extended rearing.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Acclimating smolts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond.

Following are the specific rearing and release strategies used at this hatchery:

Spring Chinook

- Rear 1.6 million spring chinook to a size of approximately 20 fish/pound and release on-station from mid-March through the first of April. All fish are marked prior to release.

- Rear 700,000 spring chinook to a size of approximately 20 fish/pound and release off-station into the East Fork of the Salmon River in late March. All fish are marked prior to release.

Summer Steelhead: No summer steelhead are reared at Sawtooth Hatchery, but some are volitionally released after acclimation.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection and Spawning

Spring Chinook: Due to low numbers of returning adults, all spring chinook collected are used for basin-wide hatchery programs. Adults are collected throughout the entire run with one-third (by sex) released upstream for natural spawning. Adults are mated randomly and gametes from the entire run are used. Adults are spawned at a 1:1 male to female ratio.

Summer Steelhead: Adults collected are utilized for spawning and eggs taken are shipped to other LSRCP facilities. All wild fish are released to spawn naturally, with additional hatchery adults outplanted for supplementation and reintroduction. Adults are spawned at a 1:1 male to female ratio.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at all IDFG hatcheries is to produce quality, healthy fish that will survive to adults. Equally important is to prevent the introduction, amplification or spread of fish pathogens which might adversely affect the health of both hatchery and wild/natural fish.

IDFG has disease control and prevention programs at all of its facilities in an effort to achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease.
- Use a disease control policy which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epidemics.

Disease Prevention

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality, healthy fish. Prescribe optimal nutritional feeds and environmental conditions in the hatchery rearing containers. Use vaccines or antibiotics prophylactically in order to prevent disease.
- Restrict the introduction of infected stocks into facilities which may result in the introduction of new diseases.
- Use sanitation procedures which prevent introduction of pathogens into or within a facility.
- Conduct applied research on new and existing disease prevention techniques.

Fish Health Activities at Sawtooth Hatchery and Satellite

Health Monitoring

- At least monthly, each fish lot is given an extensive health exam.
- Prior to release, fish are given an extensive health exam.
- Whenever abnormal behavior or mortality is detected, fish pathologists will examine the affected fish, make a diagnosis and recommend appropriate treatment.
- Adults are sampled for viral and bacterial pathogens throughout the spawning period.

Therapeutic and Prophylactic Treatments

- Adult spring chinook are injected with antibiotics to control bacterial diseases.
- As eggs are collected from adults, they are water-hardened in iodophor as a treatment for viral and bacterial diseases.
- Juvenile fish are administered antibiotics, as needed, for the control of bacterial infections.
- Anti-fungal compounds are administered, as needed, to adults, eggs and juveniles for control of fungus and parasites.
- Only FDA-approved therapeutants are used.

Sanitation

- All eggs entering or leaving the facility are disinfected with an iodophor solution.
- All equipment (nets, waders, brooms, etc.) is disinfected between different rearing units.
- All tank trunks are disinfected prior to and after hauling fish to release sites.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at all IDFG facilities, as required, to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit administered by the Environmental Protection Agency.

Objective 6: Communicate effectively with other fish producers, managers and the public.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. MOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

In-Season Communication for Fish and Egg Transfers: Communication between IDFG the U.S. Fish and Wildlife Service takes place each year to coordinate fish and egg transfers in an effort to meet basin-wide goals.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development of Annual Reports

A report documenting run timing, sex composition, mortality and egg-take is submitted annually. Brood-year reports documenting all fish culture activities (diseases, mortalities, growth, etc.) and research activities are produced once the entire brood year is released.

PERFORMANCE STANDARDS-SAWTOOTH HATCHERY AND SATELLITE

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	Spr. Chinook	2,000	961	387-1,488	9
	S. Steelhead	2,100	992	2161,705	9
Adult Prespawning Survival	Spr. Chinook	90%	96.9%	95.6-99.9%	1
	S. Steelhead	90%	98%	96-99%	
Egg-take	Spr. Chinook	2,850,000	1,287,797	468K-2,900K	6
	S. Steelhead	5,000,000	1,173,631	133K-1,697K	6
Green Egg-to-Eye-up Survival	Spr. Chinook	90%	89.6%	85-92%	2
	S. Steelhead	90%	88.4%	84.0-93.8%	
Fry-to-Smolt Survival	Spr. Chinook	90%	94.8%	90-98%	8
	S. Steelhead	NA	NA	NA	
Fish Releases	Spr. Chinook	2,300,000	1,505,224	653K-2,542K	3,5
	S. Steelhead	NA	NA	NA	
Egg Transfers	Spr. Chinook	Surplus	--[1]	--[1]	
	Steelhead	All	--[1]	--[1]	
Fish Transfers	Spr. Chinook	0	0	0	
	S. Steelhead	0	0	0	
Adults Passed Upstream	Spr. Chinook	600	404	145-615	11
	S. Steelhead	NA	NA	NA	
Percent Survival	Spr. Chinook	0.5%	0.143%[2]	0.039-0.433%[2]	
	S. Steelhead	NA	NA	NA	

NA=Not applicable.
[1] Not estimated for this report.
[2] Includes naturally produced fish.

Objective 2

Measures	Species	Hatchery Goal 5-Year Averaee		Range	Constraints
Smolt Size at Release (fish/lb)	Spr. Chinook	20.0	25.2	22-30	3,5
	S. Steelhead	NA	NA	NA	
Acclimation	Spr. Chinook	NA	NA	NA	
	S. Steelhead	NA	NA	NA	3,10
Volitional Release	Spr. Chinook	Yes	Yes	--	4,7
	S. Steelhead	NA	NA	NA	3,10

Objective 3

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
Collect Adults Throughout Run	Spr. Chinook	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	6,9
Spawning Pop. >500	Spr. Chinook	Yes	448	117-894	6
	S. Steelhead	Yes	482	71-669	6
Spawning Ratio Male:Female	Spr. Chinook	1:1	1:6:1	1:1-4:1	12
	S. Steelhead	1:1	1:1	1:1	12

Objective 4

Measures	Species	Hatcher-y Goal 5-Year Average		Ranee	Constraints
Adhere to Disease Policy	Spr. Chinook	Yes	Yes	--	8
	S. Steelhead	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
TSS Effluent	All	5.0 mg/l	0.73 mg/l	0.4-1.4 mg/l	
TSS Max Effluent	All	15 mg/l	NA	NA	
SS Effluent	All	<0.1 ml/l	<0.1 ml/l	<0.1 ml/l	

Constraints/Comments-Sawtooth Hatchery

1. Poor survival of adults due to high settling pond temperatures and poor water quality.
2. High water temperatures during the adult holding period affects egg quality.
3. Cold river water temperatures during the spring and early rearing.
4. Predation in the reservoirs during outmigration reduces fish survival.
5. Cold water during the spring hinders the growth of some fish in the population.
6. Egg-take is limited by the number of adults returning to the weirs.
7. Lack of data to justify fall release, also ESA constraints.
8. Disease policy affected by lack of fish, ESA concerns, and politics.
9. Weir location is too far up the drainage to capture the maximum number of adults.
10. Need to address steelhead acclimation effects on chinook fry at Sawtooth intake, due to increased water needs.
11. Wild fish will be passed.
12. Poor survival rates limit smolt-to-adult returns.